RECENT PROGRESS OF AUTOMOBILISM IN FRANCE.

BY THE MARQUIS DE CHASSELOUP-LAUBAT.

It is more than a century since, in 1769, automobilism was born in France, with the steam carriage of Cugnot. This vehicle was of a crude, rudimentary and incomplete construction. The ideas of Cugnot were an entire century in advance of the mechanical means by which they could be realized.

The attempt led to no satisfactory results. Everything was defective—motive-power, steering, control. Nevertheless, the carriage ran, and ran so well, they say, that it broke down the enclosure of the ground on which it was tried. It is an incontestable fact that Cugnot is the inventor of automobile locomotion, and that the honor of first having imagined and realized a new method of transportation, destined to play an important part in the welfare of many lands, belongs to him.

At the end of the last and the beginning of the present century, the great wars of American Independence, of the First Republic, and of the First Empire turned the spirit of France aside from new effort in the way of any kind of locomotion.

It is in England, toward the third decade of the present century, that we see the idea of Cugnot reappear. The same impulse which moved English engineers to build railroads in order to free the great industrial centres from the economic tyranny of those who constructed canals, urged them to study methods of automobile locomotion on highways. That is to say, in its inception, automobile locomotion was considered as an auxiliary to the railroad, which it really is.

Unfortunately, the promoters of new railway lines did not at all understand the respective spheres of action of the machine on the

rail and the machine on the road. They took umbrage at automobile locomotion, and, since they had much capital and influence at their disposal, they secured a law from the English Parliament, which killed automobile locomotion effectively. This law is one of the numerous *chef d'oeuvres* of hypocrisy achieved by the English Parliament. On the pretext of furthering public interest, it virtually suppressed a potent means of progress and prosperity. It ordained that a man carrying a red flag by day, or a red lantern by night, must be kept a hundred yards in advance of every automobile vehicle.

The consequences of this legislation were not long delayed. Automobile locomotion disappeared. Yet, English builders of that period had already realized some excellent mechanical features. Certain among them had striking and remarkable schemes in regard to boilers, and had conceived extremely interesting "water-tube-boilers." The boilers, which my friends, Normand and Thornycroft, to-day place on their torpedo-boats and torpedo-boat destroyers possess all the theoretical characteristics of certain apparatus conceived half a century ago.

It is necessary to return to France, about 1885, to find the automobile vehicle again in evidence. At that time, MM. Bollée, at Mans, and the Comte de Dion, at Paris, constructed steam vehicles which ran in a satisfactory way. Then Serpollet devised his instantaneous vaporization boilers, which reduce to a minimum the chances of danger, so far as steam engines are concerned.

After that time, automobile locomotion became a subject of talk—but the appearance in 1889 of a petroleum motor, with quaternary explosion features, gave matters an impulse which promises continuance.

In 1894, the *Petit Journal* asked M. Pierre Giffard to organize the first meeting of automobile vehicles. It took place between Paris and Rouen, with a stop at Mantes. Although the design of the promoters was not that the vehicles should be run with a view to testing speed, yet the event from the very outset took on the character of a race. The Dion and Bouton steam-carriage won the race, making the run at a mean velocity of about twenty kilometres an hour.

This was a sturdy little four-wheeler, on the back of which rested the pole-bolt of an ordinary carriage, the fore-part of which had been removed. This constituted a six-wheeled affair, re-

markably supple and manageable, in spite of its length. The vehicle, empty, weighed 1.4 tons; loaded, 2.25 tons, and could develop 15 horse-power. The two front wheels, steering-wheels, were rubber-tired; the rear wheels, driving-wheels, iron-tired. This motor had the interesting arrangements of the Dion carriage, that is, the use of a Cardan joint as a substitute for the Galle chain, and the movement of the wheel by means of a drilled nave.

Almost all the other vehicles were driven by Daimler petroleum motors. The vehicles of the firm Panhard and Levassor, which controls the Daimler patents in France, had at that time the same principal characteristics as they present to-day, and which have been generally adopted. The motor maintained a fairly constant velocity of 750 revolutions; it acted on the drive-wheels situated at the back by means of a friction cone, a series of variable gears, a differential and a Galle chain; the steering-wheels were in front. The four-seated carriage weighed about a ton.

These carriages, as also the Peugeot petroleum vehicles, the motors of which were built by Panhard and Levassor, worked with remarkable regularity, which, on the whole, demonstrated to those familiar with mechanics, what a future there is in store for the petroleum carriage.

Though this first effort was attended with considerable success, the promoters of new methods of locomotion knew that much more remained to be accomplished. On November 18th, 1894, a most important meeting was held at the residence of M. de Dion, one which marked the beginning of an era of great development of automobiles in France. Those present at the meeting were Messrs. Baron de Zuylen, the Count de Dion, the Marquis de Chasseloup-Laubat, the Count de Chasseloup-Laubat, P. Gauthier, Ravenez, Peugeot, Levassor, Serpollet, Dufayel, Lavallette, Recoppé, Roger, Menier, de Place, Giffard, Emile Gauthier, Meillan, Nansouty and Moreau. It was decided at this meeting that, in the month of June of the following year, there should be a great race from Paris to Bordeaux and back (1,200 kilometres); that the carriages were to make the whole distance in one trip; and that repairs were to be made only by such means as could be carried. The contestants, according to the formula adopted, were to procure *en route* nothing but "entertainment for man and machine." It was, therefore, a race and nothing but a race.

It was, indeed, true that in a test of this kind it was extremely difficult to establish a method of competing, which should be at all logical and satisfactory. The elements entering into an appreciation of the merits and faults of automobile carriages are so complex, that up to the present time the most competent specialists consider it almost impossible to establish a general formula for the classification of contestants. It was also resolved to adhere to the course; since a test of speed, so long and so hard, would of itself eliminate any vehicle presenting the slightest flaw or insufficiency of construction.

These provisions have been completely realized and to-day a very long and a very hard course is the most assured means of testing a vehicle.

During several months the committee did considerable work; for it was not only necessary to collect funds, but also to elaborate a set of regulations, and to obtain from the proper authorities the permission to make such trials of speed on the various sections of the route. In this arduous task the committee was most efficiently assisted by MM. Marcel Desprez, Member of the Institute; Georges Berger, Deputy of the Seine, and especially by M. Michel Lévy, Engineer in Chief of Bridges and Roads. Thanks to the efforts of the committee, the whole matter was organized in spite of a multiplicity of difficulties. Numerous participants arrived; among them, it gives me pleasure to note two Americans—Mr. Gordon Bennett and Mr. Vanderbilt.

During the early part of June, when all was ready, the vehicles were for several days placed on view in a permanent public exhibition, which attracted much notice. On the 11th of June, at nine o'clock, all the contestants were gathered in Paris, about the Arc de Triomphe. They started in procession, with no attempt at speed, toward Versailles, where the test was to begin. Toward eleven o'clock, all the carriages lined up on the Place d'Armes at Versailles in front of the great Chateau, according to their order of starting, as determined by lot. I verified rapidly all the marks which I had made during the exhibition by means of the stamp with which the committee had entrusted me. I stamped also all the spare movables carried by the vehicles. Finally, at 12.05 noon, I gave the signals for departure, two minutes apart. This race, favored by splendid weather, was a success and created a sensation.

Thanks to the co-operation of local authorities, of the Touring Club of France, of the Bicycle Associations and the instructions prepared by M. Varennes, there was not the least accident to any of the riders; all went well. The registration, both at fixed points and moving with the race, worked perfectly, and, on the other hand, the minute verifications of the marks of my stamp showed accurately, that the contestants had really accomplished the task "by their own means."

M. Levassor returned to Paris, Porte Maillot, June 13, 1895, at 12.57.30, thus accomplishing the formidable course of 1,180 kilometres (Versailles-Bordeaux-Versailles-Paris) in 48 hours and 48 minutes. He supervised the machine himself constantly, except when ascending an occasional incline, when the rate of speed was comparativly slow, and when he had entrusted the lever to his mechanic. If it be noted that he was on his carriage from 7 o'clock in the morning, June 11, it will be seen that M. Levassor remained on his machine about 53 hours, and nearly 49 of these on the run. Yet he did not appear to be over-fatigued; he gave the final signal to the registering clerk with a firm hand and took, with great relish, a cup of bouillon, two poached eggs and two glasses of champagne.

The general mean of his velocity was 24.012 kilometres an hour: the maximum was 30 kilometres an hour, between Orleans and Tours.

The vehicle which had accomplished this marvellous record without a single break-down or any stops (except those required to take on water and petroleum and one stop for cleaning, of about a quarter of an hour, near Bordeaux), weighed 604 kilos, without supplies or the weight of the two men riding. It had three velocities; 9, 20 and 30 kilometres an hour, the normal number of revolutions being 750. The motor, a new type of "Phœnix," built by M. Levassor, was a Daimler, modified and much perfected. The Levassor carriage, like all the swift carriages engaged in this race, was mounted on solid rubber tires.

A steam carriage, by Dion and Bouton, of about 15 horse-power, which had been making between 50 and 60 kilometres an hour on test, kept in the lead to near Vouvray, on the banks of the Loire, where a break-down in the shafting threw it out of the race. At that moment, in spite of losses of time, occasioned by the cleaning of gratings and the defective organization of re-

lays, where water and coke had to be taken on, this vehicle was a score of minutes ahead of M. Levassor's carriage. This first steam road-carriage of M. de Dion was probably the most rapid in existence until quite recently. After having undergone some modifications and improvements, it was purchased by M. Michelin, a large manufacturer of pneumatics, and it has continued one of the swiftest and most stable in the maintenance of velocity that I have ever seen. It weighs a little less than two tons, and with its 12 to 15 horse-power easily and without strain makes 50 to 60 kilometres an hour on a level.

Other carriages from Panhard and Levassor and from Peugeot likewise made good records.

The characteristic feature of the race is the triumph of petroleum over steam. The fact is, I gave the signal for departure at Versailles to 15 petroleum vehicles and to six steam vehicles: we noted the return to Paris of 8 petroleum vehicles and of one solitary steam vehicle. This latter was the heavy omnibus by Bollée, constructed and run by able engineers of Mans, who covered the course in spite of numerous break-downs, thanks to extraordinary physical endurance, and to a mechanical skill worthy of their excellent reputation.

The only electric vehicle entered in this race was constructed by M. Jantaud, the eminent builder, who has since then made a specialty of electric carriages. It was a remarkable piece of machinery, especially for that epoch. But owing to the warping of the axle of one of the front wheels, due to a shock, he could not cover the route swiftly enough to utilize the relays of storage-batteries, which he had held in readiness along the line.

After having distributed the prizes, and made its report as a whole, the committee of the Paris-Bordeaux race, on my proposition, declared itself a permanent organization, designed to give to the automobile industry a rallying centre and encouragement based upon conditions of competency and impartiality.

Some months later, MM. de Dion and de Zuylen took the initiative in changing the permanent commission into a sub-committee, adjunct of a society for encouragement of automobile locomotion. Thus the Automobile Club was born, which, in three years and a half, has grown, as to the number of its members, from about 50 to nearly 2,000; and which, because of its large pecuniary resources, and by reason of the liberal and scientific spirit which

animates the encouragement it gives to the new industry in every way, is certainly to-day one of the most useful and commendable institutions in France.

The Automobile Club of France, for which we have selected the abbreviation "A. C. F.," resolved to organize a race from Paris to Marseilles and back, for September 24, 1896. This course, 1,711 kilometres in length, could certainly have been covered in a single trip by machines with relays of men; but the incontestable danger, which a night-run at full speed involves, led the committee to adopt the principle, which has since been followed, of a test by stages, so regulated that vehicles shall not be obliged to run by night, save in case of long delays, due to breakdowns on the road.

It was decided that the start should be made at Versailles, and that the course should be divided into ten stages; Auxerre, Dijon, Lyons, Avignon, Marseilles, Avigon, Lyons, Dijon,, Sens, Paris. In each of these towns the vehicles were to be put up in a park under surveillance; the replacing of broken parts was prohibited, but ordinary repairs could be made by whatever means came to hand. Of the 32 vehicles, ranged about the Arc de Triomphe de l'Etoile on the 24th of September at nine o'clock in the morning, and which began their run to Versailles on the same day toward noon, 29 returned to Paris. The three which broke down were the only steam vehicles. Again a triumph for the petroleum carriage.

This race was again won by a Panhard and Levassor carriage, which covered the entire course in 67 hours, 42 minutes and 58 seconds, equivalent to a mean velocity of 25.20 kilometres an hour. This carriage was followed closely by other carriages of the same house. The greatest speed, during a single stage, was about 30 kilometres an hour.

The Peugeot carriages also did good work. The firm Delahaye of Tours made its reputation on this occasion, by one of its vehicles, which came in a good fourth.

But the most prominent event of this test was the extraordinary power of resistance displayed by the new petroleum tricycles constructed by the firm Dion and Bouton. Contrary to all prognostications, these diminutive vehicles, the weight of which is hardly more than that of the man who mounts them, covered the immense track almost as fast as the carriages, in spite

of horrible weather and a veritable equinoctial cyclone during the second and third days—from Thursday, the 24th, at midnight, to Friday, the 25th, at noon, the barometer fell from about 770 to 739 millimetres.

As to the three steam vehicles, they could not accomplish the course. The Dion carriage, which had run the Paris-Bordeaux course, and which was driven by M. Bouton, stopped at Suresnes, even before the start was made, in consequence of a rupture in its large new pneumatic tires, which M. Michelin had fitted to it, without having studied and perfected them sufficiently.

The two other steam vehicles were almost identical brakes, especially constructed for this race, weighing about three tons when made ready for the trip, developing about 18 horse-power when run in compound, and probably a little more than 30 when run by direct action from the large cylinder. Of these two powerful machines, one, in charge of M. de Dion himself, could not go further than Montereau, about 80 kilometers from Paris. The other, of which my brother and I had taken charge, with a fireman and two machinists, took 85 hours to reach Lyons. During this long trip (we took only 12 hours' rest, from Friday midnight till Saturday noon), we spent 47 hours on repairs, on the open road—part of the time, and that the greater part of it (the night of Thursday to Friday, and of Saturday to Sunday), in a drenching rain. It goes without saying that, at the end of a dozen hours so lost, we made not the least pretence of catching up with our more fortunate competitors, but we wished to make a fight for the honor of the steam-principle by finishing the run at least; a purpose which we did not relinquish until the machine was entirely crippled at Lyons.

Almost every part of the mechanism was out of working order, and we had every break-down conceivable, except an absolute explosion of the boiler. We had even carried away a piece of the frame, which we replaced by means of an iron bar, forged by ourselves in a village.

I shall attempt to give here no complete details of this eventful journey, of which, however, I made most careful notes at the time. Complete enumeration of all that happened to us would prove quite lengthy. Suffice it to say, that we ran down a dog, overturned two carts (whose drivers, frightened at the sight of our enormous machine, turned to the left at the very last mo-

ment), upset a cow, and, finally, broke down a fence in trying to make a turn on soft and heavy soil. As for ourselves, in spite of our rubber hats, vests and trousers, and the provisions of all kinds which we carried with us, we were in a condition, which I prefer not to describe. My brother and I have been over some pretty rough ground in travelling, notably in the Indies, in Japan, in Central Asia, and in the Sahara; but never were we so utterly tired out and so devoid of every similitude of humanity, as when we reached Lyons.

In spite of all that, this carriage is a good vehicle. The accidents that happened to us were due to the fact that the machine had started without sufficient preparation and test. The proof of this is that, a few months later, in January, 1897, the same carriage, in charge of my brother, after some modification and improvement, won in a brilliant manner the Marseilles-Nice-Turbie race, covering the 233 kilometres in 7 hours, 45 minutes, 9 seconds, a mean velocity of about 30 kilometres an hour. This result is still more satisfactory if the unusually uneven and sinuous nature of the road is considered, as also the stops necessary to take on water and coke, and the fact, that without facing certain death, one did not dare to let the heavy vehicle coast on any of the heaviest down-grades.

It was on one of these down-grades that Charron, who was running a Panhard petroleum carriage, and who wanted to catch up with us at any cost, was upset at a turn. Charron and his machinist were thrown out, though they were not hurt at all, and the vehicle turned a complete somersault, and landed on its wheels,—as was demonstrated in an undoubted way by the traces of gravel on the upper part of the carriage. It sustained no serious injury, except the destruction of the steering bar, which Charron repaired with a bit of wood. It returned to Fréjus without a stoppage of the motor.

The tests of Paris-Bordeaux and Paris-Marseilles have shown that automobile carriages can cover long distances on ordinary roads; Marseilles-Nice-Turbie goes to show their practical value, by proving that they can get over the heaviest down-grades.

It was also on this last occasion that really considerable velocities were attained for the first time. Between Ollioules and Toulon, we made 5 kilometres in less than 5 minutes; between Cannes and Nice, the speed officially registered for Michelin was

about 50 kilometres an hour; ours was a little greater than that, since Michelin had left Cannes on his steam brake five minutes after us, and we were stopped for eight minutes on the outskirts of Nice by an overheated axle, during which time he ran by us like an express train. The second prize was won by a Peugeot petroluem carriage; for, in the first part of the run, Michelin had lost considerable time by the rupturing of his pneumatic tires, which he had not yet been able to bring to the highest degree of perfection.

This race was the only one ever won by a steam carriage, and it will probably be the last in view of the incessant progress made to-day in the construction of petroleum motors, making it possible for them, other things being equal, to develop power superior to that of steam apparatus, as far as now known.

Of course, the petroleum motor has not the elasticity of a steam motor, but it has a peculiar steadiness and a wonderful power of endurance. It has but one weak point, its cylinder, and but one delicate structure, its carburetor; while the steam engine has numberless sources of injury in its boiler, its tubings, its pumps, its cylinder-heads, etc., which are simultaneously subjected to extreme pressures, due both to the steam and to violent jolts on rough roads. Besides, to make a one horse-power hour with a petroleum motor requires about 0.750 kilos of oil and, since the invention of the radiator or surface-condenser, the same water can be used indefinitely for cooling the cylinder. On the other hand, the steam motor requires, for the horse-power hour, about one kilo of fuel and ten kilos of water. The stops necessary to replenish are, therefore, much more frequent with the second of these systems, than with the first.

Since these events, speed in races has constantly increased. In the Paris-Dieppe race in July, 1897, a small Bollée carriage, a sort of tricycle with rear driving-wheels, made the run at a mean speed of about 42 kilometres an hour. Almost the same record was made by the first contestants taking part in the Paris-Trouville race, 170 kilometres, in August, 1897. In the great race, Paris-Amsterdam-Paris, in July, 1898, made in several stages, Charron, running a Panhard two-seated carriage, attained a mean velocity of 44.7 kilometres. Finally, in the recent Versailles-Bordeaux race, one stage without stop, the mean velocity attained by the winner, Charron, on the total run of 565 kilometres, was

48.776 kilometres. On certain quite lengthy stretches of the course, the mean speed passed 60, and at some points reached even 70 to 80 kilometres an hour. This carriage, from the establishment of Panhard and Levassor, weighs about a ton and carries an equipoise motor of from 12 to 15 horse-power.

However astounding these velocities, they are surpassed by the record tests in kilometres made in the park d'Achères, near Paris, not, as frequently stated, on a specially prepared track, but on an ordinary road, with the sole advantages of three or four kilometres of virtually straight road and of being absolutely shut in from interfering vehicles on test days, since the track crosses property belonging to the City of Paris.

On January 27, 1899, Genatzy, mounting a carriage not specially constructed for great speed, left the starting-point and covered two kilometres in one minute and 41 4-5 seconds—the first kilometre, with a standing start, in 57 seconds, that is, at the rate of 63.166 kilometres an hour; and the second kilometre, with a running start, in 44 4-5 seconds, that is, at a rate of 80.357 kilometres an hour.

On March 4, 1899, Count de Chasseloup-Laubat, on a Jantard carriage, not specially built for this style of test, but with certain most important modifications—such as running the front and rear of the carriage out into sharp points, so as to offer least resistance to air—covered the same course of two kilometres in 1 minute, 27 2-5 seconds—the first kiolmetre, with a standing start, in 48 3-5 seconds, or at the rate of 75 kilometres an hour; and the second kilometre, with running start, in 38 4-5 seconds, or at the rate of 92.783 kilometres an hour.

Finally, on April 29, 1899, Genatzy, riding a carriage specially built to break all records, and which has the shape of a large cigar mounted on four small wheels, made the two kilometres in one minute 21 4-5 seconds—the first kilometre, with a standing start, in 47 4-5 seconds, and the second kilometre, with a running start, in 34 seconds, or 105.852 kilometres an hour.

The two contestants have stopped there, since Count de Chasseloup-Laubat had no desire to build a special carriage for the purpose of breaking the Genatzy record; but, all things considered, it is almost certain, that the two contestants, should they wish to make the effort, can reduce the kilometre to about 30 seconds, that is, to a rate of 120 kilometres an hour. This re-

sult, astonishing as it may appear, is, to my mind, less extraordinary than velocities already attained; that is to say, at the rate of 75 kilometres an hour, with a standing start. For, even if locomotives have frequently surpassed the speed of 120 kilometres an hour, I believe no engine has as yet covered a kilometre from a standing start at the rate of 75 kilometres an hour. The start of one of these electric carriages absolutely leaves the impression on the observer of the start of a rocket.

It is well to note that all racing or record carriages are mounted on pneumatic tires, without which these great speeds would seem impossible. Among the manufacturers who have been enabled, by perseverance and experience, to construct air-cushions that will stand these tests, it is proper to mention M. Michelin de Clermont-Ferrand.

But the object of automobilism is not solely to obtain ever-increasing velocities. Many good judges are of the opinion that a maximum speed, and one that cannot well be sensibly surpassed with due regard to essential conditions of safety, has already been attained. The great velocities actually reached are only possible with persons specially skilled in such matters, and on tracks where it is possible to see far enough ahead to be assured of the absence of obstacles.

In the same way, the Automobile Club, true to its purposes and its programme, is not confined to the encouragement of races. It has organized exhibits of carriages, where the public can examine the different vehicles and the different systems which their originators extol. It has also organized gatherings of cabs and of "heavy-weights," that is to say, vehicles designed to transport a large number of passengers or a considerable weight of merchandise at slow rates of speed. During these tests, which last several consecutive days, the competing vehicles are stabled every night in a building under the surveillance of the Automobile Club. A technical commission carefully notes the weights of requisites of every kind (water, fuel, grease, etc.), as well as the quantity of electrical energy required for each vehicle. On each of these, a special commissioner keeps a road-journal, noting carefully the stops, the repairs, mean velocities made on different sections of the road, and in a general way all information of interest. On the track, mounted inspectors and commissioners on light and rapid petroleum vehicles circulate constantly. All re-

pairs, the duration of the concourse in the park, etc., are noted on return in the evening. In a word the most minute particulars are taken, to study in a most serious and impartial fashion the qualities and faults of each of the vehicles concerned. The technical commission then meets, and makes a general report according to the information and documents which it has received, as well as a specific report for each vehicle. It then decides upon some measure of recompense, if there be reason for it, for the vehicles which seem most deserving.

From all these races and meetings, it is evident that steam, electricity and petroleum have, each of them, drawbacks and advantages. Without wishing to enter upon a technical dissertation, which would not be *á propos*, and would exceed the limits of this article, it may be said that, in the existing status of the science, each system, presenting different advantages and disadvantages, seems intended for a different line of application.

The steam carriage requires about 11 kilogrammes of its total weight for supplies for the horse-power hour: it needs a mechanic as fireman, independently of the conductor: its maintenance is quite complicated and difficult; but it is relatively inexpensive, furnishes a steady power, can start up readily with a heavy draft and takes hills easily. It seems designed, therefore, for heavy traffic, and for running across broken country and on roads carefully studied and of determined lengths.

The electric carriage is of simple construction, and runs with relative ease. Better than steam, it is adapted to rapid movement at starting and on up-grades. It works without noise or vibration. But the 20 or 30 kilogrammes of storage-battery weight actually necessary to make the horse-power hour, and the length of time required to re-charge the storage-batteries, necessarily limits its sphere of action. It is, *par excellence*, the urban vehicle, especially for passenger traffic, rather than for freight.

The petroleum carriage, which requires only 0.750 kilogrammes of supplies for the horse-power hour, is hardy, relatively simple and readily run. But its vibrations, though much diminished in the new equipoise motors, are still quite perceptible. The combustion of the oil produces a disagreeable odor, if carburization is not thoroughly regulated. The danger of fire from the presence of the fuel, which must needs be carried, is always to be feared from the slightest imprudence. The motors hitherto built are

not elastic, and, save in racing carriages, are a little feeble in starting and on an up-grade. It is a good carriage for service in both city and country combined. For long runs, it is actually the only one available.

Such is to-day the technical situation of the question.

This summary, necessarily incomplete, shows how great recent progress in automobilism in France has been. It shows, also, the prominent part which the Automobile Club and its founders have played in this recent progress, by creating a centre of encouragement for all the interests of the new industry in general. This progress has necessarily aroused some detraction, some jealousy, some envy. It must necessarily do battle with the ill-will of many, of certain officials, of certain local authorities, although on the whole, the masses and the authorities have been very favorably disposed toward the new method of locomotion.

Mechanical vehicles can certainly be utilized in restricted localities, not sufficiently important to permit remunerative exploitations by railways, even by a narrow gauge road. In fact, the automobile is as free on the roads as a ship at sea. According to the changing needs of local traffic a variable number of vehicles can be put on without the heavy expense necessarily involved in the construction and maintenance of a railroad, a permanent and fixed expense not influenced by trade, whether the latter be good or bad. There is no doubt whatever that, if automobilism had appeared a score of years earlier, none of the ruinous electoral railroads, constructed on the Freycinet plan, would have been begun. There is furthermore no doubt but that the recent progress of the new industry has already tended to moderate that financial plague, the small local railroads, built as a detriment to the nation at large, for the benefit of a few.

One of the principal causes of the actual attainment of automobilism is certainly the good condition of the roads in France. The mass of the French nation understand that, on the one hand, automobilism, by making a large use of the superb network of roads which the railroad has depopulated somewhat, will give new life to many localities now almost abandoned. They also understand that the best way of compelling the Government to maintain this network of roads is to justify the expense of maintenance by new modes of locomotion, capable of rendering service according to the needs of our times. In a modern nation,

it may be taken for granted, that automobilism and the network of roads are intimately interdependent.

As to the economic and social changes brought about by this new method of locomotion, they are certainly not as profound as those which the building of railroads and the application of the electric telegraph called into being; yet they are far from being insignificant, and there is no temerity in the thought that they will have a real import in the very near future. The study of practical mechanics will receive an extraordinary impulse among all classes of the population, and out of it will grow a *rapprochement* between idle wealth and the laboring man. Distance will be of less importance than in the past in countries that boast a network of good roads. With mechanical vehicles in general use it will be an easy matter to live 20 or 30 kilometres from the place of one's daily avocations, especially in summer, and it will be considered a promenade to go for breakfast 50, 100 or 150 kilometres away from home. Profound modifications will undoubtedly result from this, not only in country life, but, what is more important, in the life of a numerous class inhabiting our large cities. Automobilism, even more than our suburban railway lines, will cause the great city of the future to extend even further than it has in the past, and will permit a greater number of men to enjoy the ineffable blessing of pure air, of green grass and of sunlight. Automobilism is a means of progress, of well-being, and of civilization.

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